

Date: 10/12/06

To: US Patent Examiner: Mr. James Kish (4 pages)

Application number: 10/668,801

Title: Rapid and Non-invasive Optical Detection of Internal Bleeding

Inventors: Winston Zonb Ho, Fu Nan Wang, and Bo Young Suh

Contact: Winston Z. Ho, Tel (562)801-2088, Fax (562)801-2089

winstonho@maxwellsensros.com

**RECEIVED
CENTRAL FAX CENTER
OCT 12 2006**

Dear Mr. Kish:

We will like to discuss with you and arrange an interview regarding this office action.

Thank you. Please do not put this draft in record.

1. This invention is to provide a non-invasive optical method for diagnosing internal bleeding by detecting leaked blood inside human abdomen and comprising administering a fluorescent compound through IV injection; providing a light beam containing a wavelength absorbable by the fluorescent compound, wherein the light beam is illuminated and **transmitted through a vaginal posterior fornix (a thin layer of tissue separated the upper portion of posterior vaginal canal and abdominal cavity) for female or rectal wall**; detecting a fluorescence signal produced from the fluorescent compound in the leaked blood collected in the cul-de-sac cavity, where is the lowest part of human abdomen.
2. The important invention of this invention is the **probing location**; either via vaginal fornix tissue or rectal wall, these tissues are relatively thin, on the order of 2 - 4 mm. Because of this thin tissue, therefore, the light beam can transmit through this thin layer of tissue into the abdominal cavity and probe the leaked blood in the abdominal cavity.
3. **Chan's disclosure did not mention the probing location.** From our own experiment, it is impossible to penetrate the tissue more than 1 cm even using high power infrared light without damage the tissues, not to mention the fluorescence transmitted back to the outside for detection. For example, it is impossible to penetrate the light through belly skin and tissue, which has thickness of 4 - 10 cm, and collected the fluorescence signal for detection.
4. Haaland's disclosure using an optical probe to illuminate cancerous tissue of the cervical or colorectal area. The method is to detect cancer "inside or on the surface of the tissue"; while our method is to detect leaked blood "through a thin layer of tissue"; the blood is located in the abdominal cavity. The optical detection principle and method are also very different. Haaland's fiber optic probe is based on vibration spectroscopy, while our invention is based on fluorescence spectroscopy. Haaland used far infrared wavelength, 4 -15 μm , while we used 400-800 nm. Haaland's method is based on reflection intensity of the illuminating light from tissue itself; while our method is based on fluorescence from IV injected ICG, therefore our system requires high passed optical filter to remove the illumination light source. Furthermore, cervical